

What is claimed is:

1. An antibody specifically recognizing phosphatidylinositol-3,4-biphosphate.

5 2. The antibody of claim 1, wherein the antibody is a monoclonal antibody.

3. The antibody of claim 2, which recognizes an antigenic determinant comprising an inositol group and a glycerol backbone in phosphatidylinositol-3,4-biphosphate.

10 4. The antibody of claims 1, which is substantially non-cross-reactive with at least one compound selected from the group consisting of phosphatidylinositol-4,5-bisphosphate, phosphatidylinositol-3,4,5-triphosphate, phosphatidylinositol-1,4,5-triphosphate, and phosphatidylinositol-1,3,4,5-tetraphosphate.

15 5. A hybridoma producing the antibody of claim 2.

6. The hybridoma of claim 5, which has the properties of the deposit identified by the accession No. FERM-BP-6849.

20 7. A method of producing the antibody of claim 2, the method comprising culturing the hybridoma of claim 5.

8. A variable region of immunoglobulin heavy chain specifically binding to phosphatidylinositol-3,4-biphosphate, comprising an amino acid sequence set forth in SEQ ID NO: 2 or an amino acid sequence of SEQ ID NO: 2 in which one or more amino acid  
25 residues are substituted, deleted or added.

9. A variable region of immunoglobulin light chain specifically binding to phosphatidylinositol-3,4-biphosphate, comprising an amino acid sequence set forth in SEQ ID NO: 4 or an amino acid sequence of SEQ ID NO: 4 in which one or more amino acid  
30 residues are substituted, deleted or added.

10. CDR1 in immunoglobulin heavy chains specifically binding to phosphatidylinositol-3,4-biphosphate, comprising an amino acid sequence set forth in SEQ ID NO: 5 or an amino acid sequence of SEQ ID NO: 5 in which one or more amino acid residues are substituted,  
35 deleted or added.

11. CDR2 in immunoglobulin heavy chains specifically binding to phosphatidylinositol-3,4-biphosphate, comprising an amino acid sequence set forth in SEQ ID NO: 6 or an amino acid sequence of SEQ

BEST AVAILABLE COPY

ID NO: 6 in which one or more amino acid residues are substituted, deleted or added.

12. CDR3 in immunoglobulin heavy chains specifically binding to phosphatidylinositol-3,4-biphosphate, comprising an amino acid sequence set forth in SEQ ID NO: 7 or an amino acid sequence of SEQ ID NO: 7 in which one or more amino acid residues are substituted, deleted or added.

13. CDR1 in immunoglobulin light chains specifically binding to phosphatidylinositol-3,4-biphosphate, comprising an amino acid sequence set forth in SEQ ID NO: 8 or an amino acid sequence of SEQ ID NO: 8 in which one or more amino acid residues are substituted, deleted or added.

14. CDR2 in immunoglobulin light chains specifically binding to phosphatidylinositol-3,4-biphosphate, comprising an amino acid sequence set forth in SEQ ID NO: 9 or an amino acid sequence of SEQ ID NO: 9 in which one or more amino acid residues are substituted, deleted or added.

15. CDR3 in immunoglobulin light chains specifically binding to phosphatidylinositol-3,4-biphosphate, comprising an amino acid sequence set forth in SEQ ID NO: 10 or an amino acid sequence of SEQ ID NO: 10 in which one or more amino acid residues are substituted, deleted or added.

16. An immunogen composition for use in producing an antibody specifically recognizing phosphatidylinositol-3,4-biphosphate, comprising a mixture of a dead Salmonella cell as an adjuvant and phosphatidylinositol-3,4-biphosphate.

17. A method for producing an antibody specifically recognizing phosphatidylinositol-3,4-biphosphate, the method comprising using an immunogen composition of claim 16 for immunization.

18. An immunoassay method which comprises the steps of reacting the antibody specifically recognizing phosphatidylinositol-3,4-biphosphate or a variable region thereof with phosphatidylinositol-3,4-biphosphate present in a sample, and detecting the binding based on an immunological reaction between the antibody or a variable region thereof and the biphosphate.

19. An immunoassay method of claim 18, which comprises observing the degree to which the immunological reaction between the

antibody or a variable region thereof and an antigenic determinant recognized thereby is inhibited by phosphatidylinositol-3,4-biphosphate present in a sample.

20. A kit for immunoassay for phosphatidylinositol-3,4-biphosphate comprising the antibody of specifically recognizing phosphatidylinositol-3,4-biphosphate or a variable region thereof.
- 5

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER: \_\_\_\_\_**

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**